




UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/668,350	09/24/2003	Masakazu Morishita	03500.015922.1	4315
5514	7590	03/11/2004	EXAMINER	
FITZPATRICK CELLA HARPER & SCINTO			LEE, SHUN K	
30 ROCKEFELLER PLAZA			ART UNIT	
NEW YORK, NY 10112			PAPER NUMBER	
			2878	

DATE MAILED: 03/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/668,350	Applicant(s)  MORISHITA, MASAKAZU	
	Examiner Shun Lee	Art Unit 2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16, 18 and 19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16, 18 and 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 09/985,534.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>0903</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because:

- (a) reference character "30" has been used to designate both charge converter (pg. 7, line 18) and common detector (pg. 30, line 13); and
- (b) reference character "31" has been used to designate both electrodes (pg. 9, line 5) and plurality of conversion elements (pg. 30, line 12).

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. The drawings are also objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: 137, 138, and 1008. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

3. The drawings are further objected to because reference characters "126" and "127" in Fig. 6 should probably be deleted (see reference characters "126" and "127" in Fig. 14 and 37 CFR 1.84(p)). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

4. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

5. The abstract of the disclosure is objected to because of the length. Correction is required. See MPEP § 608.01(b).

6. The disclosure is also objected to because of the following informalities:

(a) "Gas" should probably be --GaAs-- (e.g., in line 8 on pg. 18, in line 16 on pg. 18, etc.);

(b) on pg. 18, "CDt" in line 26 should probably be --CdTe-- (see Fig. 5); and

(c) on pg. 30, "amplifier 15" in line 25 should probably be --amplifier 140-- (see 37 CFR 1.84(p), upper electrodes "15" in Fig. 1, and amplifier "140" in Fig. 6).

Appropriate correction is required.

7. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

8. Claims 5, 6, 9, 10, 13, and 14 are objected to because of the following informalities:

- (a) in claim 5, "said charge conversion means" on line 3 should probably be --said conversion means--;
- (b) in claim 6, "storage capacitors" on line 6 should probably be --said storage means--;
- (c) in claim 9, "said charge conversion means" on line 2 should probably be --said conversion means--;
- (d) in claim 10, "said charge conversion means" on line 2 should probably be --said conversion means--;
- (e) in claim 10, " or larger" on line 3 should probably be deleted (it should be noted that the claim already has the limitation "at least 1 eV");
- (f) in claim 13, "said insulating substrate" on line 3 should probably be --an insulating substrate--; and
- (g) in claim 14, "said charge conversion means" on line 2 should probably be --said conversion means--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 1-16, 18, and 19 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: a plurality of pixels to other elements.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 1-5, 8, 11, 12, 14, 15, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Antonuk *et al.* (US 5,262,649).

In regard to claims 1 and 18, Antonuk *et al.* disclose (Figs. 1 and 2) a radiation image pick-up device for performing image pick-up by using radiation, comprising:

- (a) a plurality of pixels (30, 52; column 9, lines 60-64);
- (b) a wavelength converter (44) for converting incident radiation (10) into light;
- (c) conversion means (30) for converting the radiation passing through said wavelength converter (44) and the light converted by said wavelength converter (44) into a charge (column 12, lines 11-19), said conversion means (30) having a radiation detecting efficiency (*i.e.*, direct ionization signal; column 16, lines 58-68) that depends on thickness of the conversion means;
- (d) storage means (22, 38) for storing the charge (column 10, lines 44-49);

- (e) reading means (column 10, lines 10-22; column 17, lines 8-15) for reading a signal corresponding to the charge stored in said charge storage means (22, 38); and
- (f) a plurality of output lines (54) for outputting the charges read from said plurality of pixels (30, 52), said plurality of output lines (54) being connected to said plurality of pixels (30, 52).

While Antonuk *et al.* also disclose that the radiation detecting efficiency (*i.e.*, direct ionization signal; column 16, lines 58-68) depends on the conversion means thickness, the device of Antonuk *et al.* lacks an explicit description that the radiation detecting efficiency is at least 20%. However, Antonuk *et al.* further disclose (column 11, lines 1-9) that the choice of the thickness of the conversion means depend on considerations such as desired readout speed. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to select a radiation detecting efficiency (*e.g.*, 20%) in the device of Antonuk *et al.*, in order to obtain a desired readout speed.

Applicant is advised that should claim 1 be found allowable, claim 18 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

In regard to claim **2** which is dependent on claim 1, Antonuk *et al.* also disclose (column 12, lines 36-39) first reset means for resetting the charge in said storage means (22, 38).

In regard to claim **3** which is dependent on claim 2, Antonuk *et al.* also disclose (Figs. 1 and 2) that said plurality of pixels (30, 52), said output lines (54), and said first reset means are respectively formed on an insulating substrate (12), said first reset means includes a reset thin film transistor (52), and each of said plurality of pixels (30, 52) includes a read thin film transistor (52).

In regard to claim **4** which is dependent on claim 3, Antonuk *et al.* also disclose that said reset thin film transistor (52) and said the read thin film transistor (52) are made of non-single crystalline semiconductor (*i.e.*, a-Si:H; column 8, lines 43-51).

In regard to claim **5** which is dependent on claim 1, Antonuk *et al.* also disclose (Figs. 1 and 2) a transparent electrode (38) that is located between said wavelength converter (44) and said conversion means (30) and transmits the light converted by said wavelength converter (44).

In regard to claim **8** which is dependent on claim 1, Antonuk *et al.* also disclose amplifiers (*i.e.*, preamplifier; column 10, lines 12-13) for signal amplification in said plurality of output lines.

In regard to claim **11** which is dependent on claim 2, Antonuk *et al.* also disclose (column 10, lines 10-22) a second reset means for resetting said plurality of output lines, said second reset means connected to said plurality of output lines.

In regard to claim **12** which is dependent on claim 1, Antonuk *et al.* also disclose (column 7, line 58 to column 8, line 16) that said read means is composed of a thin film transistor (52) made of non-single crystalline semiconductor.

In regard to claim **14** which is dependent on claim 1, Antonuk *et al.* also disclose (column 8, lines 25-28) that said conversion means (30) is made of a semi-insulating (*i.e.*, intrinsic) semiconductor.

In regard to claim **15** which is dependent on claim 1, Antonuk *et al.* also disclose (column 8, lines 37-42) that said wavelength converter (44) includes a phosphor.

In regard to claim **19**, the method steps are implicit for the apparatus of Antonuk *et al.* since the structure is the same as the applicant's apparatus of claims 1 and 18.

13. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Antonuk *et al.* (US 5,262,649) in view of Jeuch *et al.* (US 5,391,881) and Elabd (US 5,818,052).

In regard to claims **6** and **7** which are dependent on claim 1 in so far as understood (see 35 U.S.C. 112, second paragraph rejection above), Antonuk *et al.* also disclose (column 8, lines 25-28) that said conversion means (30) has a semiconductor substrate (*e.g.*, divided into plural regions) for converting radiation into charge. The device of Antonuk *et al.* lacks that the semiconductor substrate and an insulating substrate are laminated such that first elements (*e.g.*, divided electrodes) on the semiconductor substrate and second elements (*e.g.*, storage capacitors) on the insulating substrate are electrically connected with each other. However, hybridization

is well known in the art. For example, Jeuch *et al.* teach (column 2, lines 14-36) that a semiconductor substrate (*i.e.*, detector) is hybridized to planar integrated circuit chips having a mosaic of reading circuits in order to electrically connect the detector to the reading circuits. As another example, Elabd teaches (column 7, lines 29-43) that hybridization provides the advantage of improved flatness of a semiconductor substrate (*i.e.*, detector). Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to hybridize (*i.e.*, laminate) the conversion means (30) to the reading means in the device of Antonuk *et al.*, in order to improve the flatness of the conversion means.

14. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Antonuk *et al.* (US 5,262,649) in view of Guyot (US 4,948,978).

In regard to claim 9 which is dependent on claim 1, while Antonuk *et al.* also disclose (column 8, lines 17-29) that said conversion means (30) is formed in a semiconductor substrate (32, 34, 36) as a p-i-n photodiode, the device of Antonuk *et al.* lacks an explicit description that p-i-n photodiode has a pn junction portion. However, photodiodes are well known in the art. For example, Guyot teaches (column 9, lines 1-4) that a PIN diode is a PN junction with intrinsic central part. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention that the p-i-n photodiode in the device of Antonuk *et al.* has a pn junction portion.

15. Claims 10 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Antonuk *et al.* (US 5,262,649) in view of Itoh *et al.* (US 4,937,454).

In regard to claim **10** which is dependent on claim 1, while Antonuk *et al.* also disclose (column 11, lines 19-44) that said conversion means (30) comprises for example, a-Si:C:H, the device of Antonuk *et al.* lacks an explicit description that the energy band gap of the a-Si:C:H conversion means (30) is at least 1 eV. However, the properties of a-Si:C:H are well known in the art. For example, Itoh *et al.* teach (column 4, lines 22-32) that the a-Si:C:H energy band gap is at least 1 eV. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention that the energy band gap of the a-Si:C:H conversion means (30) in the device of Antonuk *et al.* is at least 1 eV.

In regard to claim **16** which is dependent on claim 15, the device of Antonuk *et al.* lacks a reflective layer on a radiation incident side of said wavelength converter. However, reflective layers for wavelength converters are well known in the art. For example, Itoh *et al.* teach (column 4, lines 17-19) to form a reflective layer on the radiation incident side of the wavelength converter in order to reflect the fluorescence. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a reflective layer in the device of Antonuk *et al.*, in order to reflect the fluorescence to the conversion means.

16. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Antonuk *et al.* (US 5,262,649) in view of Kobayashi *et al.* (US 5,793,047).

In regard to claim **13** which is dependent on claim 1, the device of Antonuk *et al.* lacks that said charge storage means and said read means are formed on an insulating substrate in a same layer structure having a lower electrode, a dielectric film, a high

resistance semiconductor layer, a low resistance semiconductor layer, and an upper electrode. Kobayashi *et al.* teach (Fig. 9B) that a charge storage means (C11) and a read means (T11) are formed on an insulating substrate in a same layer structure having a lower electrode (22), a dielectric film (27), a high resistance semiconductor layer (24), a low resistance semiconductor layer (25), and an upper electrode (26) in order to improve the yield ratio by matching process and characteristics (column 9, lines 44-62). Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a same layer structure for the charge storage means and the read means in the device of Antonuk *et al.*, in order to improve the yield ratio by matching process and characteristics as taught by Kobayashi *et al.*

Double Patenting

17. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

18. Claims 1-16, 18, and 19 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 19 and 21-35 of copending Application No. 09/985,534 in view of Antonuk *et al.*

(US 5,262,649). Claims 19 and 21-35 of copending Application No. 09/985,534 lacks that the radiation detecting efficiency is at least 20%. However, detector material properties such as radiation detecting efficiency is well known in the art. For example, Antonuk *et al.* teach that radiation detecting efficiency (*i.e.*, direct ionization signal; column 16, lines 58-68) depends on the conversion means thickness and (column 11, lines 1-9) that the choice of the thickness of the conversion means depend on considerations such as desired readout speed. Therefore the claims in the application define an invention that is merely an obvious variation of the invention claimed in copending Application No. 09/985,534.

This is a provisional obviousness-type double patenting rejection.

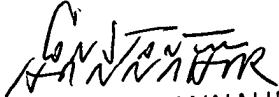
Conclusion

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (571) 272-2439. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SL


CONSTANTINE HANNAHER
PRIMARY EXAMINER
GROUP ART UNIT 2878